

# Phase IV Final Inspection Report & Completion Statement and Class A-3 Response Action Outcome Statement

**Release Tracking Number: 3-21844**  
**140 Granite Avenue**  
**Dorchester, Massachusetts 02124**

## **Volume I**

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# **Phase IV Final Inspection Report and Completion Statement and Class A-3 Response Action Outcome Statement- Neponset II Park Project- Contaminated Soil Excavation and Site Capping RTN 3-21844**

## **Introduction and Purpose**

This report is the final submittal in a series of documents regarding the investigation and remediation of sites of release to allow for construction of the Neponset II Park in Dorchester. This park is part of a larger Neponset River Park system.

The purpose of this report is to provide a record, description and confirmation of soil removal activities in accordance with the Phase IV Design Documents and in support of submittal of a Class A-3 RAO for RTN 3-21844. The closure is supported by a previously filed activity and use limitation (AUL) (attached). This document is also the final LSP opinion document for this site.

## **Site History and Chronology**

The area encompassed by the site of release that is the subject of this RAO is a component of a larger Neponset River Park system that includes an extensive rail trail, the Neponset II Park of which this site is a portion as well as the larger downstream Pope John Paul Park. . The site is bounded by City of Boston Streets to the west and north, the Rail Trail on the south and by private property to the east. This particular component of the park system is part of lands that came to be called the Neponset II Park and the park is comprised of this site of release as well as a portion of the rail trail and land coincident with two other sites of release between the rail trail and the Neponset River. This is the last piece or component of the Neponset II Park to receive an RAO.

The DCR (then MDC) first investigated the property in late 2001 in conjunction with their land taking activities. The DCR retained CDW Consultants Inc. to undertake a Phase I investigation and report from November 2001 to February 2002. Reportable concentrations of contaminants were detected in soil and groundwater at the property.

In light of these findings, CDW was then tasked to develop a Phase II Comprehensive Site Assessment Report which was completed April 30, 2002. The Phase II report including the risk assessment documented an array of contaminants of concern at the property including metals and PCB's. A fire had destroyed the on site buildings so the remaining features were floor slabs, pavement, large machinery and two defunct railroad sidings. A truck scale and chain link fence also remained in place. A Method 1 and 2 Risk Characterization was completed as part of the Phase II and it was concluded that "soil and groundwater contamination above Method 1 risk assessment (RA) standards will require further assessment and/or response actions prior to achieving regulatory closure".

Following completion of the Phase II/III reports by others for this portion of the park as well as other two areas and a portion of the rail trail that crossed and essentially divided the Neponset II Park, CDM was engaged to provide for a park design including remediation of contaminants of concern. Additional soils data was collected by CDM throughout the park footprint and this data

was used to define 4 areas for subsequent excavation. Areas 1, 2 and 3 were associated with metals contamination and were in the western portion of the property while Area 4 was associated with PCB contamination and was in the eastern portion of the property. However, Area 4 also contained metals and some low concentrations of PCB's were later discovered in the other areas. One of the defunct rail sidings was associated with Areas 1, 2 and 3 while the other appeared to be associated with Area 4.

Demolition of walls, bins and similar structures is not addressed in this document.

## **Remedial Action Cleanup Goals**

The Phase IV design established a cleanup goal of 1 ppm total PCB's per self implementing TSCA guidance. For the metals, the key parameters being lead and zinc, the goal was to achieve compliance with upper concentration limits (UCL's) at all points, 6000 and 10,000 mg/kg respectively. However, the lead UCL has been lowered from 6,000 mg/kg to 3,000 mg/kg since the remedial portion of construction was completed. However, since all points were excavated to less than 6,000 mg/kg total lead, the average is consistently less than 3,000 mg/kg across the site. While site data was reviewed to check that the site wide average met the new UCL value, additional assessment was not considered to be required in light of the capping remedy and companion activity and use limitation.

## **Remedial Design**

The remedial design of the Phase IV Report was followed with appropriate field adjustments to the areas of excavation as noted on the as built drawing. The draft Phase IV documentation was reviewed as noted in the attached MassDEP review letter. Consistent with this letter, extensive additional environmental media sampling and analysis was undertaken and the remedial action at this site is a full 3 foot clean soil cover and marker layer consistent with the letter's recommendations.

The design was developed to encompass the entire Neponset II Park area while this RAO covers strictly that area north of the rail trail defined as RTN 3-21844.

## **Construction**

CRC Construction was the general contractor for the overall Park construction with GZA Remediation supplying the expertise in contaminated soils management as the experienced subcontractor. DCR supplied the full time resident engineer and CDM was the LSP of record. Construction began in summer 2004 and all remedial activities were confirmed complete by July 2005. The LSP attended weekly progress meetings, viewed the site at key points during the excavation progress and communicated regularly with the resident engineer.

The following listed goals stated in the Phase IV Design Report were accomplished as noted in ( ):

1. Prevent contact with known or potentially contaminated material. (The site is now fully capped with a 3 foot clean layer of soil and geotextile marker layer).
2. Minimize the potential for vapors or dust emanating from contaminated material. (The contaminated material is well below the surface and a soil management plan is required if the cap is to be penetrated).

3. Prevent erosion or run-off that could damage the physical integrity of the barrier or result in potential mobilization and migration of contaminants. (The established turf, pavement and drainage features were all designed and installed to prevent erosion and to maintain the viability of the cap and park).
4. Resist degradation by construction with the appropriate materials. (The geotextile fabric and barrier soils are appropriate for a park cap).
5. Comply with applicable federal and state technical standards. (The soil cap is consistent with the caps applied at other Boston urban parks with similar contaminants of concern. The S-1 layer of soil is composed of clean, natural materials. The TSCA PCB standard of 1 ppm was met and soil was conveyed to appropriate out-of-state disposal facilities).
6. Include a defining layer that visually identifies the initial barrier layer. (The woven geotextile is a distinct defining layer).
7. Ensure long-term effectiveness by including appropriate monitoring and maintenance procedures. (The park will be maintained and inspected by DCR personnel along with the greater Neponset park system and trail. Maintenance is also required by the terms of the AUL).

Soil removal took place consistent with the design tempered by two rounds of soil sampling and analysis. The first round was used to verify the edges of the 4 defined soil removal areas from the Phase IV work and to supply disposal parameter sampling and analysis requirements for the disposal facilities. The second effort was used to refine the edges of the 4 defined soil removal areas. Confirmation of TCLP treatment was also accomplished prior to soil shipping. In addition to sampling and analysis results, site features assisted in defining the highly impacted soil layers for removal.

During construction, two IRA conditions became evident, in the north central portion of the property near excavation Area 3, described further below. The first of these was a large piece of machinery that leaked hydraulic oil some time after design investigations but prior to construction. The second was an underground storage tank discovered in the same general area. The respective RTN's were 3-23874 and 3-24411. Both of these conditions were addressed under their own release tracking numbers that were then linked to the main RTN. Soil from around these areas was removed during the IRA and additional soil was removed as part of the main excavation in Area 3.

The contractor took advantage of the existing paved areas on the property and excavated across the site from east to west such that the trucks were running on paved areas minimizing the generation of mud and dust and simplifying decontamination. The existing site scale was rehabilitated, certified by the City of Boston, and used to weigh out the vehicles following decontamination and prior to exiting the site. All soil was transported to out of state facilities operated by EQ or Waste Management Inc.

Demolition of walls, floor slabs and similar site features as well as removal of large pieces of machinery are not included in this document as they were not considered as part of the release.



In keeping with the MassDEP letter, the contractor and engineer/LSP observed the soils throughout the excavation process for potential asbestos containing material (ACM). No such material became evident during the work. Moreover, the most highly impacted material removed from the site was conveyed to facilities able to accept asbestos containing materials. The remaining soil was graded to conform to design grades prior to placement of fill, the geotextile, clean cover soil and park features. This work afforded further opportunity for observation of subsurface conditions and no additional areas of concern were found.

Due to issues regarding submittal of as built drawings by the contractor and various punch list items, all work at the park was completed some time later. This resulted in delay in submittal of this report.

## Soil Remediation

Soil containing PCBs in excess of 50 mg/kg were transported to EQ in Michigan. Following confirmation sampling and analysis to document removal of the PCB soils, areas with TCLP lead failures were addressed. The remediation subcontractor, GZA Remediation, used the "Macetite" Process for treatment of soil that failed the TCLP test for lead. This material was generally applied in situ, although in some areas the contractor pulled material to a higher elevation with the backhoe bucket prior to liquid application and mixing. Samples of the treated material were collected at 160 cubic yard/250 ton increments to verify compliance or to indicate the need for further treatment. All treated soil and soil that may not have need treatment but required removal were transported to TREE, the Waste Management facility in Rochester, New Hampshire. Note that the Macetite process had already been approved by MassDEP for use on the Central Artery and other projects.

Excavation depths varied from a minimum of approximately 4 feet to a maximum of approximately 9 feet. Natural soil was generally found at about 6 to 8 feet below ground surface and was generally present as a layer of organic soil up to about 1 foot thick over a marine silt or clay. More upland areas to the north and east appeared to have natural sand deposits. A total of over 21,000 tons of urban fill soil was removed from the property with excavation to some depth on approximately 60% of the area of the property.

As noted above, there were two IRA conditions that were closed out and then the area was subject to additional mass excavation. Since all post excavation samples indicated concentrations less than the goal of UCL attainment, no further sampling was done. Sampling and analysis data associated with the IRA conditions appears in those submittals.

The final configuration of the excavation areas appears on the as-built plan attached to this document.

In terms of quantities, these appear in Table 1 by disposal category with a column total. All values are in tons of soil. There is a column for contract quantities which the contractor bid to remove, the estimated quantity following additional sampling and analysis by the contractor, and the final quantity from the truck weights. The final weight amount included approximately 500 tons of soil and debris that was piled in Area 3.

We note that all over 50 PCB completed excavations, in addition to post excavation samples, were visually inspected and appeared clean, especially the smaller area on the west side of Area 4.

**Table 1**  
**Remediation Soil Quantities**

<b>Category</b>	<b>Tons of Soil</b>		
	<b>Contract Quantities</b>	<b>Estimated Quantities based on Additional Testing</b>	<b>Final Quantities by Truck Weights</b>
RCRA/TSCA Landfill (PCB >50)	2,000	3,000	2,444
RCRA/TSCA Landfill (PCB >50) & RCRA Material out-of-state	17,000	18,100	18,969 <sup>1)</sup>
RCRA Material In-state	2,000	0	0
<b>Total</b>	<b>21,000</b>	<b>21,100</b>	<b>21,413</b>

**Note:** Other contaminated materials shipped included 25 tons steel/debris and 131 concrete/debris.  
1) Includes approximately 500 tons from two soil and debris piles in Area 3.

All sidewalls and bottoms were visually inspected by the LSP as the excavation proceeded. The approach was that GZA designated the over 50 PCB areas based on prior data and these were subsequently modified based on bottom and sidewall sampling. The excavations were laid out in the field by the Contractor's Engineer, checked by DCR Resident Engineer and Project LSP and the soil removed under manifest. GZA then collected post excavation samples and submitted these for CRC, DCR and CDM review. Upon attainment of less than 50 mg/kg PCB in the excavation Area 4, the over 50 mg/kg removal activity was terminated. The higher PCB concentrations appeared linked to oily or dark stained soil providing some additional useful visual interpretation of the extent of contamination. While PCBs were associated with dark or were in oily soil, oily soil was not necessarily PCB contaminated.

Also, CRC was directed not to on-site reuse the asphalt pavement layers but to remove all such material to an off site permitted recycle location.

Per the specification, all monitoring wells were appropriately abandoned prior to major soil remediation, i.e. after over 50 PCB's soils were taken out. No wells remained on the site based on the LSP's inspection of the contractor's work and two previously unknown wells were located and removed by the contractor. The wells were pulled or otherwise removed and the holes filled with cement grout. Subsequent excavation and grading was also monitored for the presence of any additional wells.

While all soil quality data available was considered during the remedial work, preference was given to the recent sampling by large test pits and post excavation visual observation rather than the earlier small diameter borings results of the Phase I, II and IV reports. As noted, native soil and cleaner fill at the edges was readily apparent vs. the dark, contaminated fill with ample debris

content in the excavation areas. Hence, the contractor could refine the cut lines as the excavation proceeded. When the contractor undertook test pitting or excavation and any confirmatory resampling, it was possible to observe soil conditions in a given area as well as collect a composite sample over an interval or area that was more truly representative of an exposure point concentration given that equal or uniform amounts could be collected, appropriately mixed in a bowl and a truly representative sample provided. Also, debris and other material as well as layering could be observed and the sample collected from the most appropriate points.

## Utilities Considerations

At the southern edge of the property is the 54 inch diameter main interceptor sewer for south Dorchester. A 36 inch diameter drain from upgradient areas runs across the property to the Neponset River and a large diameter natural gas line is located in the rail trail. A key concern during construction was potential breakage of utilities, in particular the interceptor sewer with the potential for loss of raw sewage and a discharge to the river. Given the threat of such a release to public health and welfare as well as the difficulty in making repairs, excavation around the sewer was accomplished with great care and it is expected that some contaminated soil remains under the sewer and the storm drain. This potential for remaining highly impacted soil is also noted in the activity and use limitation opinion.

## Soil Excavation by Area

As note above and in prior documents, the excavation areas were called 1 through 4. Areas 2 and 3 ended up being combined. The final configuration of these areas is illustrated on the as built plan in the map pocket. Sampling and analysis data developed as the construction proceeded was also associated with these four areas. Table 2 presents the data points and the concentrations remaining of the three key parameters of concern, lead, zinc and PCB's. Pre construction/ Pre CAM data for soil left in place upon completion of excavation appears first in the table with the original tabulations. The table is color coded to show samples with less than the natural background limit of MassDEP of 100 mg/kg total lead. It is similarly color coded to show samples in excess of the current UCL of 3,000 mg/kg total lead. As stated above, the original UCL cleanup goal of 6,000 mg/kg that was the criteria at the time of soil removal is not exceeded in any remaining soil sample. The table also contains a note column. Volume II of this submittal contains data sets developed for construction including the data in support of Table 2. In that volume is a table similar to Table 2 showing all data including that representing soils removed from the site, the PCB results, and a sketch plan showing data points remaining after excavation, for the overall completeness of the project record. Some points regarding the data are as follows:

1. Consistent with the MassDEP letter attached, over 200 additional soil samples were collected and analyzed. The total number of samples across the entire Neponset II Park from all sources, construction and historic, was almost 400.
2. Comparison of boring and geoprobe results with construction samples suggested some "drag down". The samples collected during construction were from test pits and were considered to generally be more representative.
3. Duplicate samples were not consistent, apparently due to the inconsistent chemical quality of the soil, even over very short distances.



**Table 2**  
**Neponset**  
**Remaining Soil North of Trail**  
 (Analytical Results reported in parts per million [ppm] unless otherwise noted)

	<i>Date</i>	<i>Sample ID</i>	<i>Depth (ft.)</i>	<i>Lead</i>	<i>Zinc</i>	<i>Notes</i>
	<b>MCP</b>	<b>UCL</b>	<b>0-15</b>	<b>6,000/3,000</b>	<b>10,000</b>	
Investigation (Phase I/II/IV)	3/18/03	GP-3	0-4	1,600	1,400	
	3/18/03	GP-3	4-8	170	410	
	3/18/03	GP-4	0-4	940	4,700	
	3/18/03	GP-4	4-8	110	250	
	3/19/03	GP-8	0-4	1,400	1,200	
	3/19/03	GP-8	4-8	420	380	
	3/18/03	GP-9	0-4	780	810	
	3/18/03	GP-9	4-4.5	2,900	2,300	Under Former Building Footprint
	3/18/03	GP-10	7-12	770	530	
	3/18/03	GP-10	12-16	26	54	
	3/18/03	GP-14	0-4	400	880	
	3/18/03	GP-14	4-8	57	52	Under Former Building Footprint
	3/18/03	GP-15	0-4	270	740	
	3/18/03	GP-15	4-8	23	44	
	3/19/03	GP-16	0-4	11	28	
	3/19/03	GP-16	4-8	20	77	
	5/27/02	CDW-5	2-4	103	277	
	5/27/02	CDW-7	10-12	86.1	516	
	12/12/01	B-16	0-4	1,780	1,550	
	12/12/01	B-18	4-6	17.3	71.5	
	5/27/02	B-39	11-15	8.19	18.9	
	5/27/02	B-40	7-11	44.6	50.3	
	5/27/02	B-41	5-7	3,670	NA	Under Former Building
	5/27/02	B-42	10-12	140	106	
	5/27/02	B-43	8-12	8.76	29.9	
	5/27/02	B-44	8-12	10.6	38	
Construction	07/13/04	Area 1 SW1-1	4-8	4,770	1,360	Construction
	07/13/04	Area 1 SW3-1	4-8	1,620	7,060	
	07/13/04	Area 1 SW2-1	4-8	2,010	2,940	
	07/13/04	Area 1 SW4-1	4-8	3,140	5,630	
	07/13/04	Area 1 SW4-2	0-4	4,810	5,740	Bounded by RR Embankment and Granite Avenue Wall
	07/13/04	Area 1 SW4-3	4-8	1,480	3,640	Bounded by RR Embankment and Granite Avenue Wall
	07/13/04	Area 1 SW3-2	0-4	657	1,220	Bounded by RR Embankment and Granite Avenue Wall
	07/13/04	Area 1 SW3-2	4-8	1,050	1,680	Bounded by RR Embankment and Granite Avenue Wall
	07/14/04	Area 1 SW2-2	4-8	173	473	Bounded by RR Embankment and Granite Avenue Wall
	07/14/04	Area 1 SW1-2	0-4	684	551	Bounded by RR Embankment and Granite Avenue Wall
	07/14/04	Area 1 SW1-2	4-8	45.8	92.1	Bounded by RR Embankment and Granite Avenue Wall
	07/14/04	Area 1 BS1-2	8	280	584	
	07/14/04	Area 1 BS1-1	8	4,180	1,780	
	07/14/04	Area 1 BS2-2	8	53.4	350	
	07/14/04	Area 1 BS2-1	8	575	1,080	
	07/14/04	Area 1 BS3-2	8	4,300	9,140	
	07/14/04	Area 1 BS3-1	8	848	1,970	
	07/14/04	Area 1 BS4-1	8	1,050	1,720	
	10/12/04	Area 1 SW3-1A	0-4	549	769	
	10/12/04	Area 1 SW2-1A	0-4	137	244	
	10/12/04	Area 1 SW1-1A	0-4	835	1,060	
	07/14/04	Area 1 CS1-2	4-8	3,980	NA	Disposal Composites (Corners)
	07/14/04	Area 1 CS4-2	4-8	3,580	NA	Disposal Composites (Corners)
	07/12/04	Area 2 SW 1	4-8	240	285	
	07/12/04	Area 2 BS1	4	1,050	404	
	07/12/04	Area 2 BS2	8	298	365	
	07/12/04	Area 2 SW 2	4-8	467	512	
	07/12/04	Area 2 SW 3	4-8	409	261	
	07/12/04	Area 2 SW 6	0-4	2,560	7,390	
	07/12/04	Area 2 SW 6	4-8	3,140	6,090	
	07/12/04	Area 2 SW 5	4-8	362	298	
	07/12/04	Area 2 SW 4	4-8	327	318	
	10/12/04	Area 2 SW 4A	0-4	2,040	1,850	
	10/12/04	Area 2 SW 4A	4-8	642	780	
	10/12/04	Area 2 SW 5A	4-8	407	544	
	07/12/04	Area 2 CS2	4-8	4,850	NA	Disposal Composite (Center)
	07/12/04	Area 3 SW4-1(0-4)	0-4	1,370	1,100	
	07/12/04	Area 3 SW3-1(0-4)	0-4	5,340	5,070	




**Table 2**  
**Neponset**  
**Remaining Soil North of Trail**  
(Analytical Results reported in parts per million [ppm] unless otherwise noted)

Date	Sample ID	Depth (ft.)	Lead	Zinc	Notes
MCP	UCL	0-15	6,000/3,000	10,000	
07/12/04	Area 3 SW3-2(0-4)	0-4	3,710	2,290	
07/12/04	Area 3 SW4-2(0-4)	0-4	1,570	1,860	
07/12/04	Area 3 SW7-2(0-4)	0-4	8.3	29.7	
07/12/04	Area 3 BS4-1	*	1,000	944	
07/13/04	Area 3 BS7-1	*	3,950	1,710	
07/13/04	Area 3 BS2-1	*	408	567	
07/13/04	Area 3 BS2-2	*	44.6	61.3	
07/13/04	Area 3 BS6-1	*	11.9	21.5	
07/13/04	Area 3 BS3-1	*	21.7	23.8	
07/13/04	Area 3 BS3-2	*	386	268	
07/14/04	Area 3 SW6-1	0-4	49.4	109	
10/12/04	Area 3 SW1-1A	4-8	172	147	
10/12/04	Area 3 BS2-1A	6	34.8	62.3	
10/12/04	Area 3 BS2-1A	8	6.48	35.9	
10/12/04	Area 3 BS1-1A	6	1.58	24.6	
10/12/04	Area 3 BS1-1A	8	1,030	773	
10/12/04	Area 3 BS1-2A	6	470	303	
10/12/04	Area 3 BS1-2A	8	78.6	78.5	
10/12/04	Area 3 BS5-1A	6	449	351	
10/12/04	Area 3 BS5-1A	8	18.3	30.9	
10/12/04	Area 3 BS5-2A	8	20.3	429	
10/13/04	Area 3 SW4-4	0-4	4,870	1,910	
07/12/04	Area 3 CS4-1	0-4	2,760	NA	Disposal Composites
07/13/04	Area 3 CS6	0-4	27.3	NA	Disposal Composites
07/09/04	Area 4 B-1-1	6	150	341	
07/09/04	Area 4 B-1-2	6	17.5	429	
07/09/04	Area 4 SW-1-3	3-6	32.1	34.1	
07/08/04	Area 4-SW-2-1	3-6	159	251	
07/09/04	Area 4 B-3-1	6	43.4	687	
07/09/04	Area 4 B-3-2	6	43.3	409	
07/09/04	Area 4 B-4-2	6	16.3	34.5	
07/09/04	Area 4 B-5-1	6	24.3	44	
07/09/04	Area 4 B-5-2	6	206	470	
07/08/04	Area 4 B-6-1	6	66.4	53.1	
07/08/04	Area 4 B-6-2	6	130	132	
07/09/04	Area 4 SW-6-3	3-6	83.3	267	
10/13/04	Area 4 BS3-3A	10	4.63	45.2	
10/13/04	Area 4 BS4-1A	6	211	152	
10/13/04	Area 4 BS4-1A	8	442	374	
10/13/04	Area 4 BS4-1A	10	37.6	49.4	
10/13/04	Area 4 BS3-3B	10	158	111	
10/13/04	Area 4 BS4-1B	8	88.6	312	
10/13/04	Area 4 BS4-1B	10	4.57	13.4	
07/08/04	Area 4 CS-2	3-6	1,980	NA	Disposal Composites
07/09/04	Area 4 CS-5	3-6	167	NA	Disposal Composites

**Notes:**

 <100 mg/kg

 > 3,000 mg/kg

Total lead conc. for 109 samples of soil remaining in the park north of the rail trail is distributed as follows:

38 ≥ 600 mg/kg (35%)

14 ≥ 3,000 mg/kg (13%)

0 ≥ 6,000 mg/kg (0%)

1. All remaining soil "above trail" covered with woven geotextile and 3 feet of clean soil.
2. Actual finished site wide averages are considered to be less than shown due to edge (site wall) effect of "hot spots" plus the extensive removals to clean native soils on a visual basis.
3. Based on a total of 289 samples north of trail (28- Phase I/II, 60 - Phase IV Design)
4. GP-6, GP-6D illustrate the potential for variability between samples, these being side by side soil samples
5. Evidence that "drag down" impacted prior results at GP-17, B-45.
6. ppm ≅ mg/kg
7. Average total lead of sample results >100 mg/kg to maximum is: 1,465 mg/kg  
100 mg/kg represents a natural soil maximum as provided by MassDEP (2002).

Each Area is discussed in sequence below.

### Area 1

This area was identified in the southwest corner of the property as shown on the as built drawings. It was bounded by the rail trail to the south, Granite Avenue with a concrete retaining wall to the west, the former rail siding to the north and less impacted soil pinching out along the intersection of the siding and mainline to the east. There was also a low wall defining the property from the railroad. Soils were removed to natural material near the large interceptor sewer, over the sewer to the rail trail and then cut slowly raising the grade to approximately one foot below grade at the railroad siding. The concrete bins, removed prior to soil excavation, had been placed over an area of fill soil and metal debris. The area of the railroad siding was slightly higher in elevation suggesting settlement of the debris and soils in the bin area and cleaner material under the siding. As noted in Table 2, soil remaining ranged in concentration of lead from 47 to 4,810 mg/kg, with an average of 1,770 mg/kg of total lead in 23 samples. Averaging of values over a 1 to 100 ratio appears justified for this site, given the high variability in the duplicate samples. This issue is further discussed under the feasibility evaluation below. As noted on the table, the site wide average of the remaining samples was 1,465 mg/kg when considering only those values in excess of 100 mg/kg, the natural soil background limit of MassDEP. The average of the samples of soil excavated from Area 1 was 25,800 mg/kg as summarized in Table 3. The more highly impacted soil appeared to be in the 0 to 4 foot depth range. All PCB soil in excess of 1 ppm was removed. Other materials encountered and removed included steel beams, and layer of grey soil like material and various metal objects.

**Table 3**  
**Average Lead Concentrations Disposal Facility**  
**Composites Removed from the Site**

<i>Area</i>	<i>Average Lead mg/kg</i>
1	25,800
2	25,300
3	40,120
4	4,700
<b>Ave.</b>	<b>23,980</b>

**Note:** 23,980 mg/kg equals approximately 2.4% by weight

It thus appears that this area was originally a low point used to dumping of metal debris followed by construction of the concrete storage bins. Near the interceptor sewer there was a layer of organic soil at about 8 feet below ground surface.

### Area 2

This area was initially defined by high metals concentrations and during construction was combined with the Area 3 excavation. The area was bounded by combining with Area 3 to the west and north and by sampling results along the railroad siding and interceptor sewer to the south. The soil to the east transitioned to a lighter color sandy soil. The range of lead in the soil remaining around and under this excavation area was from 240 mg/kg to 4,850 mg/kg (Table 2). The average of the 13 samples representing remaining soil is 1290 mg/kg lead. All PCB impacted soil in excess

of 1 mg/kg was removed. The soil that was treated and removed contained an average lead concentration of 25,300 mg/kg as noted in Table 3.

### **Area 3**

This area was defined both by sampling and analysis data and by visual assessment of conditions as the excavation progressed, exhibiting relatively abrupt transitions from highly impacted dark soils to mildly impacted light brown sandy soils, especially in the direction of the former building footprint. The remaining soil varied from a natural value of 1.58 mg/kg lead up to a maximum of 5,340 mg/kg lead (Table 2). The average value of the remaining soil is 1,070 mg/kg total lead in 26 samples. The average value of the removed soil was approximately 40,000 mg/kg (4%) total lead (Table 3).

### **Area 4**

This area was originally defined due to PCBs and was excavated to the defined goal of 1 mg/kg total PCBs. In the areas of the 36 inch main drain and the 54 inch interceptor sewer the contractor excavated close to the pipes but there may be contaminated soil remaining under the pipes, which is noted in the AUL. Generally the excavation proceeded to natural soil or to clean appearing soil along the edge tempered by the analytical results. Natural soil was a grey silt or clay material at about 6 to 8 feet in depth, with light brown sandy soil on the north and east perimeters. In the center, some of the excavations proceeded to approximately 9 feet below original ground surface to deal with some dark, oily soils. The remaining soil following excavation varied from a natural value of 5 mg/kg lead up to a maximum in fill material of 1,970 mg/kg total lead (Table 2). The average lead concentration in the remaining soil is 194 mg/kg in 21 samples. The average lead concentration in the removed soil was approximately 4,700 mg/kg (Table 3.).

As noted above, the average remaining lead concentration for all samples greater than the natural background maximum of 100 mg/kg was 1,465 mg/kg without consideration of any area or volume weighting or other factors.

### **Relationship to Other Areas of Neponset II Park and River**

This site is located north of the rail trail as well as lands bordering the River. The land bordering the river is designated as an Area of Critical Environmental Concern (ACEC). During the investigations and design activities, sediments in the river near the shore, up, at and downgradient of the park were sampled and analyzed at eight locations. No particular trend was evident in the data and our review of a recent USGS Report (USGS, 2004) indicates the contaminants detected are common to the river and higher concentrations of contaminants are present in sediment at upgradient impoundments than were present in the vicinity of the park.

### **Other Considerations/Data Usability and Representativeness (See Also Tabulation)**

**Data Assessment.** Another manner in which to view the data is to take the total number of samples and categorize the percentage above certain limits. As may be observed from the tabulations of Table 4, the results vary across the entire Neponset II Park including the trail and properties along the river but are not radically different.



**Table 4**  
**Post Phase IV Excavations**  
**Total Lead Results**

	<b>Number of Samples</b>	<b>% &gt; 100 mg/kg</b>	<b>% &gt; 600 mg/kg</b>
North of trail (this document)	109	66	35
Trail	16	75	38
South of Trail	41	49	17
<b>Total</b>	<b>178</b>	<b>63</b>	<b>30</b>

**Note:**

Number of samples includes duplicates.

**Downgradient Property Status. (DPS)** At the former Schlager Auto Body portion of the site, a DPS submittal was made against the adjacent upgradient properties. Since remediation is complete for all the park land that makes up this park and the associated listed sites, this DPS application is no longer relevant.

An unusual circumstance encountered was failure of the treated soils from Area 3 when undergoing the TCLP test. This unusual circumstance was apparently due to high zinc concentrations in the contaminated soil taking up the treatment solution and caused a need for additional treatment to allow passing test results to be achieved.

The total volume of pre-excavation urban fill and associated debris in the entire park area was estimated at 155,000 tons with approximately 22,000 tons removed excluding pavement and slabs under the Phase IV. Hence, 86% of the urban fill remains on the park. The relative cost of the additional removal is addressed below in terms of the consideration of approaching or achieving background.

### **Laboratory Data Quality Assurance**

All sample collection in the field was overseen by DCR and/or CDM and was undertaken by a qualified individual employed by GZA. The samples were all analyzed by Phoenix Laboratories using MassDEP Presumptive Certainty (CAM) (See Table filled in from Guidance Document) analytical methods where required for post excavation closure assessment.

By using test pit methods for soil observation and sample collection, it is further asserted that representative soil samples were obtained as a good visual assessment and adequate, representative sample volumes were able to be obtained as well as the ability to make observations as to the appearance of the soil. CDM reviewed each laboratory report as it was received and considers the data acceptable for the intended purposes and consistent with the sampling and analysis plans developed by GZA/Mill City and presented by CRC.

The presumptive certainty certifications were provided by the laboratory. An independent QA check of the laboratory on-site was not undertaken.

## Surveying and Mapping

The site design drawings were used as a basis for all construction plans, sketches and activities. The site features such as the edge of the rail trail, utilities, walls and boundaries were used to locate contaminated soil and to provide for other record keeping such that areas could be easily and accurately located and checked. Given the surrounding and on-site features, it was a simple matter to generally and visually check activities as to the correct location. The exact location of the sewer, drains and gas line were more particularly located in the field due to the potential major impact that could have resulted due to such utility damage.

The historic USGS map from a century ago depicts the railroad at the edge of the river with some small wetlands just to the north of the railroad bed. The land slopes up to the east from the railroad suggesting a higher topography on the east end of the site consistent with our natural appearing soil elevations being higher on the eastern end of the property. The 36 inch diameter drain was likely the location of an open stream or drainage way under the railroad which drain was simply added onto as the area was filled.

## Feasibility Evaluation

The site of release at the Neponset Phase II Park site is defined by the boundaries of the property in the sense that the releases to the soil were apparently all contained within the property and the urban fill that may extend off of the property under streets and into adjacent properties is coincident to the property and resides throughout the area. While in fact the site of release of the urban fill extends beyond the property boundaries, investigation and removal to some outward indeterminate point and to indeterminate depths is not considered appropriate. Hence, in terms of a background investigation of the urban fill soil with contaminants not expected to degrade, the assessment is focused to the portion of the release(s) within the property boundaries. It is probable that multiple releases occurred over the years to result in the configuration of contaminants prior to Phase IV activities.

There appear to be two thresholds in Policy #WSC-04-160, one of achieving background and one of meeting background, as well as three possible definitions of background from a chemical quality point of view- local assessment, natural soil impacted by the urban setting and urban fill impacted with coal or coal ash/wood ash. Given the site work to date, the urban fill impacted with coal/coal ash/wood ash is an appropriate application but may also be abrogated by the presence other contaminants and their origin that would revert the soil to a lower tier of numerical criteria. That is, the metals present on the property, while coincident with soil containing coal/coal ash, are probably not coal ash in origin, rather associated with commercial, industrial and rail related activities and should be compared to "natural soil" in the urban environment.

Since it was necessary to remove a certain quantity of soil, debris and building components to achieve a permanent solution, as well as meet the objectives of the overall park design, the addition of an imported 3-foot thick layer of clean soil was required regardless of the residual concentrations of contaminants achieved by the removal actions. Therefore, the incremental cost of the clean soil cap was essentially (or as a net value) that cost of the geotextile marker layer. Given the soil cap was part of a greater design approach, residual impacted soils at the site became S-2 and S-3 more by the overall water front redevelopment to parks, rather than due to remedial objectives alone. It is reasonable to consider that achieving or approaching background can be deemed infeasible for persistent contaminants in soil located in areas of lower exposure potential (i.e. S-2 and S-3 soil

categories). Hence, when an urban fill site is capped with three feet of clean soil in combination with a barrier or marker layer and pointed restrictions and periodic maintenance, then the remaining soil is by definition S-2 or S-3. This requires that if children are present in high frequency and intensity that the soil in the 3 to 15 foot zone or layer not be "potentially accessible" per Table 40.933(9). It would appear that incorporation of a clean soil layer, a geotextile barrier layer, paved surfaces and an AUL would render this soil no longer "potentially accessible." However, in this regard, it must be accepted that the use of the land would be for a park only in the foreseeable future and the land will not revert to some other use. By using this approach, which is more generally applied to Parks in urban areas, the contaminants that are persistent are in category S-2 and S-3 soils. Consequently, further assessment might be categorically eliminated.

Naturally, it must be recognized that if a small increment in removal could clear the site of all such limitation or restrictions, then the capping approach would be invalidated, subject to the cost benefit analysis in 9.3.3.4 on Page 17 of the Policy "Conducting Feasibility Evaluations Under the MCP" dated July 16, 2004.

A view of an impacted urban fill site is to consider the cost in a vertical profile at a given site. The cap portion is 2 feet of clean soil under pavement or 3 feet of clean soil in open areas with a barrier layer. Geotextiles, provide a robust, long term marker layer while allowing water and air to move vertically. Additional soil to be removed from a site would require as a minimum reuse/disposal at an in-state unlined landfill, with a net potential remediation cost in the area of \$50 per ton. Imported fill would cost approximately \$10 per ton to serve as cover while the geotextile cost is nominal. Hence, imported cap material generally appears cost effective compared to excavation by a sufficient margin to meet the 20 percent increment requirement of the policy. Furthermore, any urban fill site often requires 12 to 18 inches of clean fill simply for utility sake to avoid stones, glass, old foundations, variable soil conditions and related debris material from being worked to the surface over time. The net S-1 increment is more appropriately considered to be an additional 12 to 18 inches net. Further, as one moves below the capped zone, a backfill requirement and possibly a dewatering requirement are introduced into the calculations rendering the cost of bulk removal somewhat higher.

However, if removal is to take place, it is logical to interpret the policy that if a 20 percent increment in soil removal allowed one to approach or achieve background, then that increment of removal should be undertaken. The total increment of 40% could be applied vertically to the degree that if a one foot cut were to be required, then a 1.4 foot cut would be the increment to be considered to achieve background. Put another way, if 10,000 tons were leaving the site to get below UCL's, then 14,000 tons could be considered the background upper limit number in the S-1 zone of soil.

As noted above, the other part of the question appears to be one of which urban background numerical criteria to use. If ash is not present, not documented, then the lower numbers of the table provided by MassDEP would apply and the feasibility evaluation would probably extend to all fill on the site/property. If coal/coal ash is present, then the higher values would apply, but could logically be limited to the portion of the fill with the coal/ash component.

In the case of the Neponset Phase II Park Site, it appears that metals, in particular lead and zinc, are probably not attributable or associated with coal or wood ash, rather other commercial/industrial activities on the site and in the area and hence, the natural soil numbers could be more applicable to



this site in consideration of these metals. Hence a value for lead of 100 mg/kg would apply, essentially including all fill soil on the site. The 600 mg/kg number would be relevant as well given the evidence of coal ash. The relevant number for zinc corresponding to the lead number of 600 is 300 mg/kg. The total urban fill soil volume in excess of either number is several multiples of that removed from UCL exceedance hot spots and hence "presumptive certainty" regarding the policy appears to have been readily achieved. Looking particularly to north of the rail trail, the full removal of all fill would more than double the volume to be removed. The total volume of urban fill at the entire Neponset II property prior to remediation was estimated to be approximately 155,000 tons, essentially 7 times the volume removed prior to capping, clearly a disproportionate number and the comparison easily rendering further removal relative to approaching or achieving background as representing high costs for little net benefit.

## Background and Averaging Criteria

The data for the site was further reviewed in an attempt to consider averaging in certain zones, areas or across the property as a whole. Some interesting and relevant considerations are as follows:

1. Geoprobe GP-6 in the 0 to 4 and 4 to 8 foot depth range was duplicated with side by side samples. The results were as follows: 0 to 4 feet: 32 mg/kg lead and 1,800 mg/kg lead. 4 to 8 feet: 1,200 mg/kg lead and 240 mg/kg lead. The average lead is 818 mg/kg with a high to low ratio of approximately 56 to 1.

This finding and those listed below suggests that averaging at this site could appropriately take place over a 1 to 100 ratio/range of concentrations rather than 1 to 10 which is the usual accepted ratio without specific justification for a wider ratio.

2. The highest lead concentration north of the rail trail prior to remediation was 91,800 mg/kg and the lowest was 1.58 mg/kg lead, a ratio of 1 to 58,000.
3. In hot spot Area 1, an area of metals debris and highly contaminated soils, the bottom samples were collected at approximately 8 feet of depth from test pits. The concentrations, along the interface of natural and urban fill soil, ranged from 53.4 to 4,300 mg/kg lead, a ratio of 1 to 81 suggesting high variability over an area at approximately the same depth depending most likely on the amount of natural soil vs. fill in the sample. Another example is in Area 4, bottom samples 3-3A at 6, 8 and 10 feet yielding 2,300, 29,300 and 4.63 mg/kg of lead respectively. The ratio against the 8 foot sample of 12.7 to 1 for the 6 foot sample and 6,328 to 1 for the 10 foot sample.

Similarly, sample point 3-3B was 77,400 mg/kg lead at 6 feet, 6,410 mg/kg lead at 8 feet and 4.57 mg/kg lead at 10 feet below ground surface, with ratios of 12 to 1 and 16,936 to 1 respectively. These again being coincident with the transition to natural soil.

Hence, in the fill one could say there were patterns in metals and other contaminants rather than any absolute numbers. Averages over these patterns in the remaining soil are believed to reasonably represent exposure point concentrations.

Also, since the hot spots were identified north of the trail and extensively sampled and the edge samples working out from the center of the hot spots were included in the averages, it is likely that the averages of remaining soil are weighed high.

Additionally, under Section 9.3.2.2 is a discussion of "remedial work...that will substantially interrupt public service or threaten public safety may be considered infeasible." In fact, this requirement can be applied to the utility corridor that is coincident with the existing rail trail that is a large interceptor sewer and gas line. In these areas, excavation was around but not directly against or under the pipes with the direction to the contractor to get as close as possible but not to break or otherwise disturb these major lines. Mass excavation of the river front would have required extensive controls and the disturbance of river sediments and the difficulty of erosion control in the floodplain with frequent high tides would also have increased potential for impact with little net benefit.

Groundwater metals concentrations were historically significant in the area north of the trail but are expected to significantly reduce with hot spot removals. Confirmation of these changes is not planned at this time and the monitoring wells were abandoned during demolition and prior to most mass excavation. The large interceptor sewer may also act as a groundwater sink, but this possibility was not investigated.

Another item is the sediment in the River opposite the site. There were PCB's detected in four sediment samples, one upgradient and three downgradient. A sediment study conducted by USGS (USGS 2004) at two upgradient impoundments yielded similar results and hence the finding at this location is within the normal range/background detected in the Neponset River sediments.

## **Final Inspection of the Project Remedial Components**

The LSP of record, Mr. William Swanson, inspected the site on July 15, 2005. The remedial actions as detailed in the project construction documents and Phase IV Remedy Implementation Plan have been completed and no further work is required.

## **Additional Requirements**

Upon completion of all capping and paving activities, the only long term requirements are maintenance of the site soil cap for the purpose of separation of the remaining contaminated soil from any users of the park or trail. Since UCL exceedances have on average been eliminated, there is no requirement for additional remediation or monitoring, other than that the cap be periodically inspected and maintained, which is consistent with the overall intent and duties of DCR maintenance staff. The AUL specifies a soil management approach for any intrusive work below the soil cap, esp. as relates to utilities that may have to be accessed for maintenance and repair, including the sewer and drains. The easement holder, MWRA, was notified of the AUL prior to its application to the site.

## **Summary**

The objective of the soil remediation was to remove all soil in excess of UCL's of the current MCP with a secondary objective of achieving less than 1 mg/kg PCB's. These objectives were met. However, since the portion of the site that was the Sax property was highly contaminated in some

defined areas, and the overall site of the park contained all manner of urban fill and the former railroad right of way, the entire park is covered with a geotextile and at least 18 inches of soil.

A simple mass balance illustrates the overall effectiveness of the approach: 21,000 tons of soil at 24,000 mg/kg average lead is 504 tons of lead. The remaining urban fill of 134,000 tons of soil in the entire park at about 800 mg/kg average lead is 107 tons of lead. Hence, removing approximately 14% of the soil captured and removed 82% of the lead contamination.

On average, the site is much improved and the bulk of the impacted soil is removed.

In the "final analysis," the evidence suggests that the site north of the trail basically had two operating areas for a long period of time. These areas corresponded to the locations of the two entry gates and rail road sidings. Hence, a relatively low impact path down the middle of the site and concentrated contamination in the two - east and west- operating areas. The fill quality otherwise over the whole of the property was highly variable and apparently reflects years of site use and filling. With pavement and slab removal and shaping and grading in addition to the excavation areas, the entire site was "peeled" away or reworked to some degree and soil could be observed at all points in addition to the extensive sampling and analysis that was completed. With the addition of extensive volumes of new fill, geotextile and clean soil capping, the site is considered well protected for use as a park.

## **Response Action Outcome**

A Class A-3 Response Action Outcome (RAO) has been achieved for the site. The site is entirely covered with a clean soil cap and geotextile barrier layer and protected with an AUL.

## **Activity and Use Limitation**

As stated in the Phase IV report and attached hereto, an AUL has been applied to the property consistent with the clean soil cap. This approach is complimentary to the approach for the Pope John Paul Park and the rail trail and this portion of the Neponset II Park is an integral part of the Neponset II Park and the overall Neponset Park network. As a final check on the limitations of the AUL, a focused risk assessment was completed using the Method 3 short form and the soil analytical results of Table 2. This screening assessment also incorporated the results of other contaminants from the various Phase reports by using the highest value found in any samples remaining at the site. The assessment, attached hereto, demonstrates that on average the soil does not present a significant risk to construction workers. The AUL terms are more conservative than this, allowing for only emergency utility repair prior to engaging an LSP with attendant health and safety and soil management plans.

The AUL also specifies maintenance of the property consistent with park/DCR objectives.

## **Overall Summary and Conclusions**

### **Completion of Phase IV Remedy Implementation**

Site material has been capped on-site with a protective geotextile and soil barrier to minimize potential contact. The impacted site areas were restored by backfilling with non-contaminated soil and hydroseeded to control erosion.



A final inspection of the Phase IV remedy at the site was completed by the LSP of Record for the site, William Swanson, on July 15, 2005 in compliance with 310 CMR 40.0878. The LSP's opinion was that the site remediation was completed in accordance with the Phase IV RIP. The LSP opinion and details of the remedy implementation are documented in the Phase IV - Completion Statement/As-Built and Final Inspection Report sections of this document.

### **Response Action Outcome and Activity and Use Limitation**

A Class A-3 Response Action Outcome has been achieved for the site. An Activity and Use Limitation is required for the site to restrict activities that could potential damage the geotextile and soil barrier cap and/or expose the underlying contaminated material. A Permanent Solution has thus been achieved.

### **References**

CDM, 2004. Phase IV - Remedy Implementation Plan, Department of Conservation and Recreation, Neponset II Park, Dorchester, Massachusetts. April.

CDW, 1999. Supplemental Site Investigation Report Relative to Oil and Hazardous Materials, Schlager's Auto Body, 62R Hilltop Street, Dorchester, Massachusetts. June.

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EPA, 1997. Health Effects Assessment Summary Tables (HEAST). EPA/540/R-95/036. July.

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MassDEP, 2006a. The Massachusetts Contingency Plan - 310 CMR 40.0000. Bureau of Waste Site Cleanup. April.

MassDEP, 2006b. Summary of Revised MCP Numerical Standards. Available at: <http://www.mass.gov/dep/cleanup/laws/pubnot04.htm>

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MassDEP, 2002b. Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil. Office of Research & Standards. May.

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Phase Reports and IRA Completion Statements on file with MassDEP for the referenced RTN's.

Tighe&Bond, 2002. Phase II Comprehensive Site Assessment and Phase III Identification, Evaluation, and Selection of Remedial Action Alternatives Report, Metropolitan District Commission, Former T Equipment Corporation, 170 Granite Avenue, Dorchester, Massachusetts. September.

Tighe&Bond, 2002. Metropolitan District Commission, 62R Hilltop Street, Dorchester, Massachusetts. December.

USGS Fact Sheet FS-2004-3083

Form 1075

Notice of Activity and Use Limitation  
M.G.L.c. 21E §6 and 310 CMR 40.0000

Disposal Site Name: Neponset II Park  
140 Granite Avenue  
Dorchester, Massachusetts 02124-5418

Attested hereto  
*Francis M. Roache*  
Francis M. Roache  
Register of Deeds

DEP Release Tracking No.: 3-21844

This Notice of Activity and Use Limitation ("Notice") is made as of this 3/17/08 day of March, 2008 by the Department of Conservation and Recreation ("DCR"), 251 Causeway Street Boston, Massachusetts, 02114 together with its successors and assigns ("collectively Owner").

WITNESSETH

WHEREAS, the Department of Conservation and Recreation is the Owner in fee simple of those certain parcels of land located in the City of Boston (Dorchester) Suffolk County, Massachusetts, with the buildings and improvements thereon, pursuant to the Order of Taking recorded with the Suffolk County Registry of Deeds in Book 31209, Page 267 dated March 27, 2003.

WHEREAS, said parcels of land, which is more particularly bounded and described in Exhibit A, attached hereto and made a part hereof ("Property") is subject to this Notice of Activity and Use Limitation. The Property is shown on a plan recorded in Suffolk County Registry of Deeds in Book 6888, Page 65.

WHEREAS, the Property comprises all of a disposal site (RTN 3-21844) as the result of a release of oil and/or hazardous material. Exhibit B is a sketch plan showing the relationship of the Property subject to this Notice of Activity and Use Limitation to the boundaries of said disposal site existing within the limits of the Property and to the extent such boundaries have been established. Exhibit B is attached hereto and made a part hereof; and

WHEREAS, one or more response actions have been selected for the Disposal Site in accordance with M.G.L. c. 21E ("Chapter 21E") and the Massachusetts Contingency Plan, 310 CMR 40.0000 ("MCP"). Said response actions are based upon (a) the restriction of human access to and contact with oil and/or hazardous material in soil and/or (b) the restriction of certain activities occurring in, on, through, over or under the Property. The basis for such restrictions is set forth in an Activity and Use Limitation Opinion ("AUL Opinion"), dated January 10, 2008, which is attached hereto as Exhibit C and made a part hereof.

Camp Dresser & McKee Inc.  
Attn: Jay McMullen  
One Cambridge Place  
50 Hampshire St.



NOW, THEREFORE, notice is hereby given that the activity and use limitations set forth in said AUL Opinion are as follows:

1. Activities and Uses Consistent with the AUL Opinion. The AUL Opinion provides that a condition of No Significant Risk to health, safety, public welfare or the environment exists for any foreseeable period of time (pursuant to 310 CMR 40.000) so long as any of the following activities and uses occur on the Property:
  - (i) Passive and active recreation activities including, but not limited to, activity on grassed areas for children, soccer or other ball games, sitting on benches or sitting or lying on the ground surface, organized events such as fairs, lawn sales, outdoor theater or other special events;
  - (ii) Use of park facilities including minor grading, planting and seeding up to a depth of three feet below ground surface, paving of parking areas and walkways, installation of fencing with intrusion limited to driving of fence posts;
  - (iii) Utility maintenance work either not involving soil excavation and removal, or involving soil excavation to a depth of no greater than three feet below the ground surface;
  - (iv) Emergency utility repair work, lasting no longer than eight consecutive hours and involving the excavation of no more than twenty (20) cubic yards of soil. Such excavated soil must be returned to depth in its entirety at the conclusion of the repair work. The protective barrier layer, which includes a woven geotextile and three feet of overlying soils, must be replaced with a protective barrier layer of like and comparable construction, materials and specifications immediately following completion of the repair work. If soil removal from the site is to occur and the activity will occur for a duration greater than eight consecutive hours and/or more than twenty (20) cubic yards of soils from depths greater than three feet below ground surface are to be excavated, a Health and Safety Plan to address potential exposures and a Soil Management Plan must be developed;
  - (v) Non-invasive activities or uses which do not disturb or compromise the structural integrity of the protective barrier layer and the underlying contaminated soils;
  - (vi) Such other activities or uses, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare, or the environment than the activities and uses set forth in this paragraph; and
  - (vii) Such other activities and uses not identified in Paragraph 2 as being activities and uses inconsistent with the AUL.

2. Activities and Uses Inconsistent with the AUL Opinion. Activities and Uses which are inconsistent with the objectives of this Notice of Activity and Use Limitation, and which, if implemented at the Property, may result in a significant risk of harm to health, safety, public welfare, or the environment or in a substantial hazard, are as follows:
  - (i) Use of the property as a residence, school, daycare facility and/or similar uses that may involve high frequency and high intensity activities by children;
  - (ii) Use of the property for the cultivation of crops for consumptive use;
  - (iii) Excavation of soils at a depth of greater than three feet below ground surface, except as described in 1 (iv) above. Such non-emergency invasive subsurface activities, which may be part of utility repair or maintenance, or construction, cannot be performed without the involvement of an LSP, and must be conducted in accordance with the Massachusetts Contingency Plan and applicable MassDEP policies appropriate to the protection of human health and the environment; and
  - (iv) Any activities and uses which may cause physical, chemical, or structural damage to the protective barrier layer except those conducted in accordance with Obligation (i) of this Notice of AUL.
3. Obligations and Conditions Set Forth in the AUL Opinion. If applicable, obligations and/or conditions to be undertaken and/or maintained at the Property to maintain a condition of No Significant Risk as set forth in the AUL Opinion shall include the following:
  - (i) The performance of any activities including but not limited to excavation, which could cause the removal, damage, and/or disturbance of the protective barrier layer and/or contaminated soil located beneath it, without the prior development and implementation of a Health and Safety Plan and a Soil Management Plan in accordance with the guidelines discussed in the AUL Opinion attached hereto as Exhibit C to this Notice of AUL;
  - (ii) The integrity of the protective layer must be maintained and routinely inspected on at least a semi-annual basis to verify its ability to effectively prevent exposure(s) to underlying contaminated soil via dermal contact, ingestion, and/or inhalation;
  - (iii) The contaminated soil must remain beneath the protective barrier area to prevent exposures via dermal contact, ingestion, and/or inhalation; and
  - (iv) The Department of Conservation and Recreation is the Owner of the Property with jurisdiction over its use and operation. The Department of Conservation and Recreation or any subsequent owner of the Property will be solely responsible for compliance with this Notice of Activity and Use Limitation and the restrictions imposed herein.

4. Proposed Changes in Activities and Uses. Any proposed changes in activities and uses at the Property which may result in higher levels of exposure to oil and/or hazardous material than currently exist shall be evaluated by an LSP who shall render an Opinion, in accordance with 310 CMR 40.1080 *et seq.*, as to whether the proposed changes will present a significant risk of harm to health, safety, public welfare or the environment. Any and all requirements set forth in the Opinion to meet the objective of this Notice shall be satisfied before any such activity or use is commenced.
5. Violation of a Response Action Outcome. The activities, uses and/or exposures upon which this Notice is based shall not change at any time to cause a significant risk of harm to health, safety, public welfare, or the environment or to create substantial hazards due to exposure to oil and/or hazardous material without the prior evaluation by an LSP in accordance with 310 CMR 40.1080 *et seq.*, and without additional response actions, if necessary, to achieve or maintain a condition of No Significant Risk or to eliminate substantial hazards.

If the activities, uses and/or exposures upon which this Notice is based change without the prior evaluation and additional response actions determined to be necessary by an LSP in accordance with 310 CMR 40.1080 *et seq.*, the owner or operator of the Property subject to this Notice at the time that the activities, uses and/or exposures change, shall comply with the requirements set forth in 310 CMR 40.0020.

6. Incorporation into Deeds, Mortgages, Leases and Instruments of Transfer. This Notice shall be incorporated either in full or by reference into all future deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer, whereby an interest in and/or a right to use the Property or a portion thereof is conveyed.

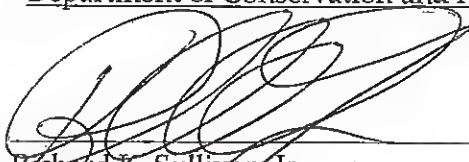
Owner hereby authorizes and consents to the filing and recordation and/or registration of this Notice, said Notice to become effective when executed under seal by the undersigned LSP, and recorded and/or registered with the appropriate Registry of Deeds and/or Land Registration Office.



WITNESS the execution hereof under seal this 3<sup>rd</sup> day of March, 2008.

OWNER: Department of Conservation and Recreation

BY:

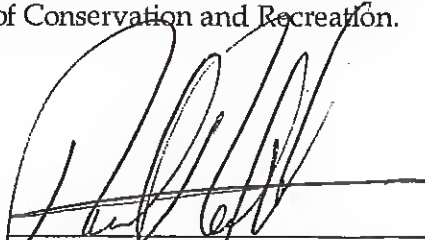
  
Richard K. Sullivan, Jr.  
Commissioner

COMMONWEALTH OF MASSACHUSETTS

Suffolk, SS

March  
January 3, 2008

On this 3<sup>rd</sup> day of March 2008, before me, the undersigned notary public, personally appeared Richard K. Sullivan, Jr. proved to me though satisfactory evidence of identification, which was my personal knowledge of the said Richard K. Sullivan, Jr. to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as Commissioner for the Department of Conservation and Recreation.

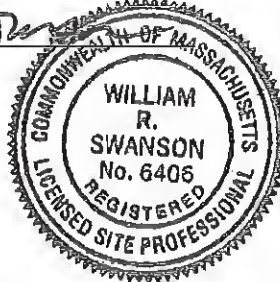
  
Notary Public  
Print Name: Nicholas A. Vontas  
My Commission Expires: Sep. 17, 2010

The undersigned LSP hereby certifies that he executed the aforesaid Activity and Use Limitation Opinion attached hereto as Exhibit C and made a part hereof and that in his Opinion, this Notice of Activity and Use Limitation is consistent with the terms set forth in said Activity and Use Limitation Opinion.

LSP Name: William R. Swanson

Date: 01/11/2008

(LSP Seal)



COMMONWEALTH OF MASSACHUSETTS

Middlesex, SS

January 11, 2008

On this 11th day of January, 2008, before me, the undersigned notary public, personally appeared William R. Swanson, proved to me through satisfactory evidence of identification, which was my personal knowledge of the said William R. Swanson, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose as a Licensed Site Professional for the Department of Conservation and Recreation.

Janet M. Cotugno  
Notary Public

Print Name: JANET M. COTUGNO

My Commission Expires June 22, 2012

Upon recording, return to:

Ms. Catherine Garnett  
Department of Conservation and Recreation  
251 Causeway Street  
Boston, Massachusetts 02114

**Exhibit A**  
**Legal Description of the Property Subject to AUL**



## Per Order of Taking

A certain parcel of land lying on the easterly side of Granite Avenue and the southerly side of Hill Top Street, and being numbered 138-140 Granite Avenue in the present numbering of said street, and being shown as the parcel marked "Roxbury Iron and Metal Co., Inc." on a plan of land entitled "Plan of Land in Boston, Dorchester, July 29, 1953, Walter R. Luby, Sur., Sheet 2," which plan is recorded with Suffolk County Registry of Deeds in Book 6888, Page 65, more particularly bounded and described as follows:

- WESTERLY** by Granite Avenue by two lines measuring 85.51 feet and 218.19 feet respectively (see the Massachusetts Department of Public Works order or taking for Route 37-Granite Avenue, dated August 26, 1958 as recorded with said Deeds in Book 7337, Page 119 and the accompanying plan of the same date being Layout No. 4727 recorded therewith);
- NORTHERLY** by Hill Top Street, a City of Boston public way, 531.34 feet;
- NORTHEASTERLY** by land, formerly of one Reddy, now or formerly, supposed to be, according to City Assessors Records. Of New England Millwork, John Desimone & William Lynch General Partners, 144.63 feet and 39.84 feet;
- EASTERLY** by land, formerly of the Milton Branch of the Old Colony Railroad, operated by the New York, New Haven and Hartford Railroad, later property of the Penn Central Transportation Company, late of the Consolidated Rail Corporation (Conrail) and now of the Commonwealth of Massachusetts, Metropolitan District Commission, 602.79 feet (see the order of taking dated June 4, 1992 recorded with said Deeds on July 2, 1992 in Book 17574, Page 239 and the railroad plan entitled "Right of Way and Track Map Old Colony R.R. Co. Operated By the New York, New Haven and Hartford R.R. Co., From Neponset To Mattapan, Station 0+0 to Station 53+14.86, City of Boston, State of Massachusetts, Scale 1"= 100 ft., June 30, 1915 Office of Valuation Engineer Boston, Massachusetts," being sheet V5/24/25/1, a copy of which is on file in the Office of the General Counsel of the DCR).

Containing 135,484 square feet, more or less as shown upon the above cited recorded plan.

The above-described premises are carried upon the City of Boston Tax Rolls as Ward 16 Parcel 4290 and are shown upon Boston Assessors Plan Ward 16078 as Block 136M.

Note: Record interest holder is the MWRA

**Exhibit B**  
**Sketch Plan**





**Exhibit C**  
**Activity and Use Limitation Opinion**

## **Exhibit C**

### **Activity and Use Limitation Opinion**

In accordance with the requirements of 310 CMR 40.1074, this Licensed Site Professional Opinion has been prepared to support a Notice of Activity and Use Limitation (AUL) for the property located at 140 Granite Avenue, Dorchester, Massachusetts, known as the Neponset II Park.

#### **Site Description and History**

The Site is located on the U.S. Geological Survey (USGS) Boston South, MA Quadrangle Map (1987) at Universal Transverse Mercator coordinates 330, 692 mE, 4,682,762 mN, and Latitude 42° 16' 43"N, Longitude 71° 03' 11"W.

The Site consists of an approximate 9-acre parcel of land located near the Neponset River in Dorchester, Massachusetts. When occupied by the Commonwealth no occupied buildings existed on the Site, which was previously used for metal refining and a scrap metal recycling yard. The foundation and basement of a former building along with building demolition debris were located on the northwestern portion of the Site. Most of the Site was paved except for the majority of the eastern portion. Several piles of building debris and limited quantities of scrap metal remained at the Site.

Concrete storage bins containing some remaining scrap metal were located on the southwestern corner of the Site. Four small sheds and a truck scale were also located at the Site. According to the City of Boston, the Site is zoned as "CL," commercial land.

The reason an AUL is being applied to this property is to preclude or appropriately manage future contact with contaminated residual soils by park users or utility workers for soils below the 3 foot thick clean soil cap and geotextile barrier layer. While the majority of the mass of contaminants was removed, some impacted soil remains on the site, especially along the base of the main interceptor sewer. Given the infeasibility of removing all urban fill soil here as well as elsewhere along the Neponset Park Corridor, referencing the rail trail and additional soils and sediments up and down river, capping and containment is both a cost effective solution and is consistent with actions taken at other similarly impacted locations.

The property was noticed as a site of release on June 12, 2002. The site was then further investigated and a Phase II/III Report was completed for the DCR. The formal submittal date for these reports was May 21, 2004, due to a prior submittal on an expired form. The Phase IV Plan was submitted on April 8, 2004 and construction started during the late spring with soil removal proceeding into the autumn. Two IRA conditions were discovered along Hilltop Street during soil removal activities in anticipation of park construction. These conditions, RTNs 3-0023874 and 3-0024411, were closed out with linking to the parent RTN. All source material associated with these conditions was removed from the site.

Remedial activities consisted of bulk soil excavation and removal to depths of 6 to 9 feet to bring lead and zinc concentrations to levels below Upper Concentration Limits (UCLs), on average, as detailed in the Phase IV Report and attached detailed engineering design documents. In addition to metals, an array of contaminants, including additional metals, polycyclic aromatic hydrocarbons

and PCBs were present in the soil. However, these other contaminants of concern were generally associated with high lead concentrations as well as visually stained or otherwise impacted soils. Upon removal of the most highly impacted soils, based on two rounds of disposal parameter analysis as well as careful visual inspection of the excavation, the park property was graded and backfilled with a cover layer of geotextile and 3 feet of clean granular soil and topsoil above the remaining contaminants. Contaminated areas also contained a considerable quantity of miscellaneous debris, including metals, wood and dark staining of the urban fill. Less impacted areas were evident by lighter colored, naturally appearing soils without debris; so excavation lines were visually refined as the field work proceeded. Where there was substantial urban fill, layering of the darker soils was also evident. Along the public way excavation was extended to the property line and was essentially on the vertical.

This approach to bulk soil removal and capping of the remaining soil mass was consistent with the remedial approach selected and applied in other areas of the Neponset River Park Corridor and as supported by the Phase II/III Report assessment and documented in the Phase IV Report and design for the project. The southern portion of the site abuts the rail trail.

### **Reason for an AUL**

So long as contact with the soil is precluded, there is a condition of no significant risk.

The reason an AUL is being applied to this property is to preclude or appropriately manage future contact with contaminated residual soils by park users or utility workers for soils below the 3 foot thick clean soil cap and geotextile barrier layer. While the majority of the mass of contaminants was removed, some impacted soil remains on the site, especially along the base of the main interceptor sewer. Given the infeasibility of removing all urban fill soil here as well as elsewhere along the Neponset Park Corridor, referencing the rail trail and additional soils and sediments up and down river, capping and containment is both a cost effective solution and is consistent with actions taken at other similarly impacted locations.

### **Permitted Site Activities and Uses**

This AUL Opinion provides that a condition of No Significant Risk to health, safety, public welfare or the environment exists for any foreseeable period of time (pursuant to 310 CMR 40.0000) so long as any of the following activities and uses occur on the Property:

- (i) Passive and active recreation activities including, but not limited to, activity on grassed areas for children, soccer or other ball games, sitting on benches or sitting or lying on the ground surface, organized events such as fairs, lawn sales, outdoor theater or other special events;
- (ii) Use of park facilities including minor grading, planting and seeding up to a depth of three feet below ground surface, paving of parking areas and walkways, installation of fencing with intrusion limited to driving of fence posts;
- (iii) Utility maintenance work either not involving soil excavation and removal, or involving soil excavation to a depth of no greater than three feet below the ground surface;



- (iv) Emergency utility repair work, lasting no longer than eight consecutive hours and involving the excavation of no more than twenty (20) cubic yards of soil. Such excavated soil must be returned to depth in its entirety at the conclusion of the repair work. The protective barrier layer, which includes a woven geotextile and three feet of overlying soils, must be replaced with a protective barrier layer of like and comparable construction, materials and specifications immediately following completion of the repair work. If soil removal from the site is to occur and the activity will occur for a duration greater than eight consecutive hours and/or more than twenty (20) cubic yards of soils from depths greater than three feet below ground surface are to be excavated, a Health and Safety Plan to address potential exposures and a Soil Management Plan must be developed;
- (v) Non-invasive activities or uses which do not disturb or compromise the structural integrity of the protective barrier layer and the underlying contaminated soils;
- (vi) Such other activities or uses, in the Opinion of an LSP, shall present no greater risk of harm to health, safety, public welfare, or the environment than the activities and uses set forth in this paragraph; and
- (vii) Such other activities and uses not identified in Paragraph 2 as being activities and uses inconsistent with the AUL.

#### **Activities and Uses Inconsistent with AUL Opinion**

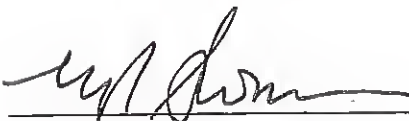
Activities and Uses which are inconsistent with the objectives of this AUL Opinion and which, if implemented at the Property, may result in a significant risk of harm to health, safety, public welfare, or the environment or in a substantial hazard, are as follows:

- (i) Use of the property as a residence, school, daycare facility and/or similar uses that may involve high frequency and high intensity activities by children;
- (ii) Use of the property for the cultivation of crops for consumptive use;
- (iii) Excavation of soils at a depth of greater than three feet below ground surface, except as described in 1 (iv) above. Such non-emergency invasive subsurface activities, which may be part of utility repair or maintenance, or construction, cannot be performed without the involvement of an LSP, and must be conducted in accordance with the Massachusetts Contingency Plan and applicable MassDEP policies appropriate to the protection of human health and the environment; and
- (iv) Any activities and uses which may cause physical, chemical, or structural damage to the protective barrier layer, except those conducted in accordance with Obligation (i) of this Notice of AUL.

#### **Obligations and Conditions Set Forth in this AUL Opinion**

If applicable, obligations and/or conditions to be undertaken and/or maintained at the Property to maintain a condition of No Significant Risk as set forth in this AUL Opinion shall include the following:

- (i) The performance of any activities including but not limited to excavation, which could cause the removal, damage, and/or disturbance of the protective barrier layer and/or contaminated soil located beneath it, without the prior development and implementation of a Health and Safety Plan and a Soil Management Plan. Plan development shall be accomplished by qualified persons with LSP oversight and review;
- (ii) The integrity of the protective layer must be maintained and routinely inspected on at least a semi-annual basis to verify its ability to effectively prevent exposure(s) to underlying contaminated soil via dermal contact, ingestion, and/or inhalation;
- (iii) The contaminated soil must remain beneath the protective barrier to prevent exposures via dermal contact, ingestion, and/or inhalation; and
- (iv) The Department of Conservation and Recreation is the Owner of the Property with jurisdiction over its use and operation. The Department of Conservation and Recreation or any subsequent owner of the Property will be solely responsible for compliance with the imposed restrictions.



William R. Swanson, P.E., LSP

01/10/2008  
Date



# **Neponset II Park RAO- Focused Post Construction Risk Characterization Via The Method 3 Short Form for the Construction Worker and Park User Scenario (Appendix B)**

## **Introduction**

The site of release has been remediated by mass excavation of the most highly impacted soils, grading, and capping of the site with a geotextile and 3 feet or more of clean soil. And the samples representing post excavation soils remaining on site are indicated in Tables 2 in the Phase IV Completion Statement, RAO text. Not all of these samples listed in the tables as remaining represent the same relative volume or depth and some were proximate to natural material, with most locations being excavated to the marine clay.

## **Data Management and Usability**

The majority of the soil samples, including all those collected during construction are CAM compliant and the data meets all requirements for use in this risk assessment. PreCAM data was by both CDM and CDW. The data quality control results for the PreCAM data were reviewed and no apparent usability issues were evident, so the PreCAM data was carried forward in this assessment. The PreCAM laboratory reports were previously provided in the Phase II and IV reports. While validation of this data could not be effected due to lack of QC backup, given the conservative nature of the closure strategy with an AUL, the consistency between the data sets, and the preponderance of CAM compliant data, this was not deemed to be an impediment.

The data was considered to occur in two tiers and was then input into the construction worker and park user "short forms" as a check relative to the AUL restrictions. The first tier of the data was for lead, zinc and PCBs, these being the primary contaminants of concern on the site. The second tier was for other contaminants in excess of urban fill background criteria for soil containing wood or coal ash, applicable given observations during investigation and construction.

The original objective was to meet the lead UCL which was 6,000 mg/kg at the time of remediation and is now 3,000 mg/kg.

## **Exposure Point Concentration Derivation**

The first tier, as noted and defined herein, is for lead, zinc and PCBs. The approach was to review each particular area of the site as defined for the soil removal operation, assess the remaining soil as represented by the samples, and deriving an exposure point concentration for each area by selecting samples likely representing significant volumes of soil remaining and then combining these locations on both an area and volume proportion basis to derive an overall site wide concentration for this portion of the park. These differ from the arithmetic averages in the text. Each area is discussed below:

## **Soil Remaining Outside Designated Excavation Areas**

These soils are represented by 16 samples selected from a larger group with an average lead concentration of 969 mg/kg, and corresponding average zinc concentration of 15 of these was 1,039 mg/kg and no detectable PCB results. (see also Table B-1)

**Table B-1**  
**Summary of Post Excavation**  
**Soils (Concentrations in mg/kg)**

<i>Area</i>	<i>Lead</i>	<i>Zinc</i>	<i>PCB's</i>
PreCAM/Not excavated (38% of Area) Post Excavation	868	804	-----
Area 1 (10% of Area)	2,380	2,626	0.58
Area 2 (4% of Area)	1,292	1,591	0.67
Area 3 (14% of Area)	1,838	1,002	0.2
Area 4 (34% of Area)	237	222	0.27
<b>Average</b>	<b>1,323</b>	<b>1,249</b>	<b>0.73</b>
<b>Area Weighted Area</b>	<b>1,004</b>	<b>950</b>	<b>0.33</b>

This area is also illustrated on the as-built drawing in the report as any location exterior of Areas 1 through 4. In addition to these reported analyses, field observations during construction suggest this to be relatively less impacted soil. In general, the 6 to 8 foot deep zone of soil near the southern extent of the site appears to be fill, while some natural appearing soils, other than organics and marine clay, were found in the northwest section where buildings were located in the upland, on the north side along the street and to the east along the neighboring property. This average (as well as all other averages) was derived first selecting all relevant and available samples and then using only those within a 1 to 100 ratio of concentrations from the highest of all groups, essentially dropping out of the averages any natural soils with little or no evident impact.

Since the designated area averages were also inclusive of some edge results, generally moving from a more highly impacted area to a less impacted area, the 4 excavation area averages are likely conservatively high.

#### **Area 1**

These soils were remaining fill soils in the southeast corner and south of the western rail spur, in a fill area. A total of 13 samples were used to conservatively, yet reasonably, to derive exposure point concentrations of 2,380 mg/kg lead, 2,626 mg/kg zinc, and 0.58 mg/kg PCBs. This area was the highest concentration of lead and zinc left in place on the property, mainly partly to the concern with disturbing the main interceptor sewer and the retaining wall along Granite Avenue. Contaminated soil may remain under the sewer.

#### **Area 2**

This area was to the southeast of area 3 along the western rail spur and ended up being excavated to merge with area 3. The averages were lead at 1,292 mg/kg, zinc at 1,591 mg/kg and PCBs at 0.67 mg/kg.



### Area 3

The results were similar to area 2, and these areas were in the location where material would be loaded or unloaded on the rail siding, managed and moved in or out of the former building. The averages were lead at 1,838 mg/kg, zinc at 1,002 mg/kg and PCBs at 0.2 mg/kg.

### Area 4

This is the eastern portion of the site that generally exhibited lower metals concentrations but higher PCB concentrations. It was essentially fully excavated at and over the sewer up to Hilltop Street, to natural soils to the east and less impacted soils to the west that may have served as a roadway at some point. Contaminated soil may remain under the sewer. The lead, zinc and PCBs were 237 mg/kg, 222 mg/kg and 0.27 mg/kg respectively.

On an overall average, the results were lead at 1,323 mg/kg, zinc at 1249 mg/kg and PCBs at 0.43 mg/kg.

The above results by area were next weighted on both an area basis and a on volume of urban fill left in place basis. On an area basis, the lead, zinc and PCBs were at 956 mg/kg, 847 mg/kg and 0.33 mg/kg. Moving to a 1 to 100 ratio, and dropping off the less impacted soils, results in 1,004 mg/kg lead, 950 mg/kg zinc and no change to PCBs. When an approximate volume rather than area basis was attempted, the lead result was 1,121 mg/kg; hence the results are quite similar.

Hence, we conclude the exposure point concentrations as derived are relatively stable when viewed on differing bases and we adopted the area weighted averages/ prescribed 1 to 100 ratio for use in the risk calculations.

### Other parameters

The removal focused on lead, zinc and PCBs but the original Phase II characterization and the disposal facility samples were analyzed for a more extensive range of contaminants. For this risk assessment, in light of the fact that fewer broad parameter post excavation results remained, the highest value recorded in the Phase I, II, IV and in excess of the urban fill background values of MassDEP were used for input into the risk computations. These were barium at 1,520 mg/kg, cadmium at 7 mg/kg, chromium(total) at 89.1 mg/kg, mercury at 44.4 mg/kg, TPH at 4,200 mg/kg, benzo(k)fluoranthene at 4.4 mg/kg, benzo(b)fluoranthene at 6.2 mg/kg and Phenanthrene at 14 mg/kg. Copper was discovered at relatively high concentrations on the site, but this parameter was not considered in this risk characterization and would likely not affect the outcome of the calculations it is expected that the bulk mass of copper was removed with the lead and zinc.

### Calculations Results

The spreadsheets from the Method 3 short form program output for a construction worker indicated an excess lifetime cancer risk from PCBs and polycyclic aromatic hydrocarbons of 3E-07, well below the acceptable risk limit of 1E-05. The hazard index is 1, at the acceptable limit. Therefore, on average, there is no risk to a future construction worker. The AUL, however, will control this function since there may be pockets of higher concentration remaining around and under the main interceptor sewer. For a park user, the excess life time cancer risk was acceptable, but the chronic and subchronic hazard indices were 2 and 4 versus an acceptable limit of 1. Hence the AUL is appropriately applied.